Claims

What is claimed is:

1. A tunable, switchable electromagnetic filter comprising:

an electromagnetic resonator;

a switch coupled to the resonator and to ground;

an impedance element coupled to the resonator, wherein the resonator, the switch and the impedance element comprise a switchable filter;

a ferroelectric tunable component electromagnetically coupled to the switchable filter;

a tuning control signal generator for generating a tuning signal, coupled to the ferroelectric tunable component;

a switching control signal generator for generating a switching signal, coupled to the switch.

2. The filter of claim 1, further comprising a microelectrical mechanical switch.

3. The filter of claim 1, further comprising a voltage source coupled to the component.

4. The filter of claim 1, further comprising a ferroelectric capacitor.

5. The filter of claim 1, further comprising a voltage source coupled to the switch.

6. The filter of claim 1, further comprising a ferroelectric capacitor having a quality factor at about 1.9 GHz equal to about 50 or greater.

7. The filter of claim 1, further comprising a second resonator coupled to the first resonator and wherein the impedance element is coupled between the first and second resonators.

8. The filter of claim 7, further comprising:

an input capacitor coupled at a first end of the input capacitor to an input port of the filter and at a second end of the output capacitor to the impedance element and the first resonator; and

an output capacitor coupled at a first end of the output capacitor to an output port of the filter and at a second end of the output capacitor to the impedance element and the second resonator.

9. The filter of claim 8, further comprising a second tunable ferroelectric component coupled to the filter.

10. The filter of claim 9, wherein the impedance element, the input capacitor and the output capacitor comprise, respectively, a third, a fourth and a fifth tunable ferroelectric component.

11. The filter of claim 7, wherein the first and second resonators comprise monoblock resonators.

12. The filter of claim 1, wherein the filter resonates at a frequency between about 1850 MHz and about 1910 MHz.

13. The filter of claim 1, wherein the filter resonates at a frequency between about 1930 MHz and about 1990 MHz.

14. The filter of claim 1, wherein the filter resonates at a frequency between about 824 MHz and about 849 MHz.

15. The filter of claim 1, wherein the filter resonates at a frequency between about 869 MHz and about 894 MHz.

16. The filter of claim 1, wherein the filter resonates in a half wave mode.

17. The filter of claim 1, wherein the filter resonates in a quarter wave mode.

18. A method of modifying a resonant frequency of a filter comprising:

resonating a resonator in a first operating mode, the resonator being coupled to a MEMS switch;

generating a switching control signal;

switching a state of the MEMS switch, responsive to the switching control signal;

changing a grounding condition of a port of the resonator, responsive to the state of the MEMS switch;

producing a second operating mode of a resonator, responsive to the grounding condition;

generating a tuning control signal;

varying an impedance of a ferroelectric component, responsive to the tuning control signal;

adjusting a resonance frequency of the resonator, responsive to the impedance of the ferroelectric component.